

AI for Macroeconomic Research

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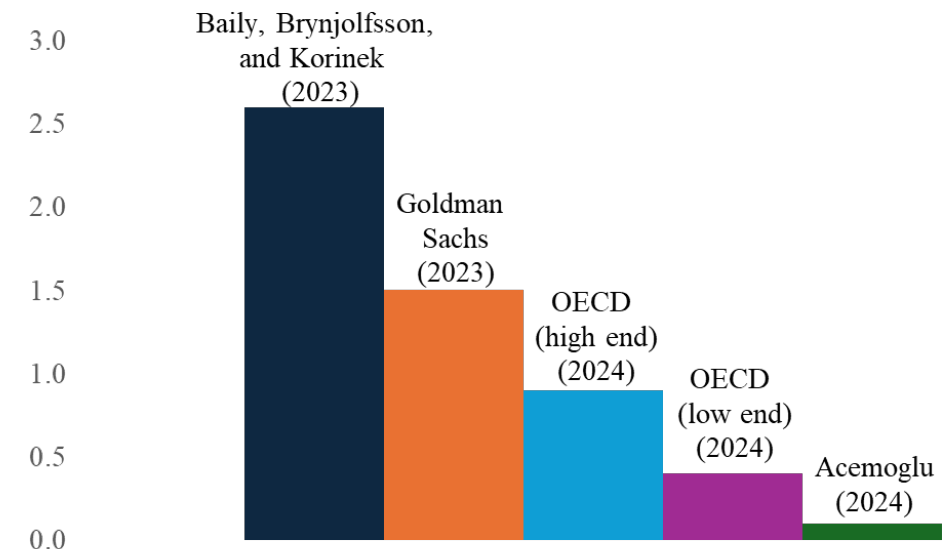
You probably hear a lot from economists about AI

But most of it is about AI impact on the economy

- Economists are as caught up with AI as any other field
- Much of the public focus has been on questions like
 - how will AI affect the labor market?
 - how will AI affect long run economic growth?
- There's clearly substantial uncertainty and thus room for more research

AI's Predicted Macro-Level Productivity Gains

% predicted increase in annual labor productivity over a 10-year horizon due to AI



Source: Filippucci, F., P. Gal and M. Schief (2024) OECD Artificial Intelligence Papers.



However, AI also reshaping how economists work

Economists are quickly adopting AI tools to use for research

- Korinek, Anton. 2023. "Generative AI for Economic Research: Use Cases and Implications for Economists." *Journal of Economic Literature* 61 (4): 1281–1317.
- Melissa Dell. "Deep Learning for Economists." *Journal of Economic Literature*, forthcoming
- Example use cases:
 - Text analysis
 - Historical archival digitization at scale
 - Handwriting
 - Images
 - Structured extraction from irregular/unstructured documents
 - Simulated survey respondents



Macroeconomics' missing laboratory

We want to talk about cause and effect to analyze policy, but...

- Aggregate, system-level phenomena
- Emergent from human interaction and institutional decision-making
- No controlled experiments
- Poor alternatives:
 - Simple mathematical models of the decision process
 - Lab experiments with college students playing the role of policymakers
 - Cost prohibitive or ethically questionable large-scale experiments



Why model monetary policy deliberations?

Monetary policy affects aggregate economic conditions

- The Federal Open Market Committee (FOMC) is the body in the U.S. central bank, the Federal Reserve, that is responsible for setting the target range for the federal funds rate (monetary policy)
 - The federal funds rate (FFR) is an overnight interest rate between banks
 - Since interest rates are interconnected, changing the FFR affects other rates
 - Interest rates affect the availability of credit which affects borrowing and lending and thus economic activity
- FOMC meetings are behind closed doors
 - Minutes released after 3 weeks
 - Transcripts released after 6 years
 - FOMC dynamics are hard to study
- What if we could simulate an FOMC meeting in real time?



FEDERAL RESERVE press release



For release at 2:00 p.m. EDT

September 16, 2026

The Federal Open Market Committee approved the following statement for release by a

12 – 0 vote:

The Committee decided to raise the target range for the federal funds rate by

1/4 percentage point to 3-3/4 to 4 percent, in support of the Federal Reserve's dual mandate. The Committee is continuing its policy of maintaining ample reserves in the banking system.

Economic activity is expanding at a solid pace. While uncertainty remains elevated owing, in part, to geopolitical developments, domestic spending has been resilient. Productivity growth is strong, and capital investment is robust. Job gains have kept pace with the workforce, and the unemployment rate has changed little.

Inflation remains elevated. Today's policy action will support a timelier return to the Committee's 2 percent goal. The Committee will deliver price stability.



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For release at 2:00 p.m. EDT

July 29, 2026

The Federal Open Market Committee approved the following statement for release by a 9 – 3 vote:

The Committee decided to maintain the target range for the federal funds rate at 3-1/2 to 3-3/4 percent, in support of the Federal Reserve's dual mandate. The Committee is continuing its policy of maintaining ample reserves in the banking system.

Economic activity is expanding at a solid pace despite elevated uncertainty that owes, in part, to the conflict in the Middle East. Productivity growth and capital investment are strong. Job gains have kept pace with the workforce, and the unemployment rate has changed little.

Inflation remains elevated relative to the Committee's 2 percent goal, in part reflecting supply shocks that have driven price increases in certain sectors, including energy. The Committee will deliver price stability.

Voting against the monetary policy action were Beth M. Hammack, Neel Kashkari, and Lorie K Logan, who preferred to raise the target range for the federal funds rate by 1/4 percentage point at this meeting.



The existing technology: the Taylor Rule

A simple rule that tracks Fed behavior remarkably well

- John Taylor introduced a simple representation of monetary policy decision making in a 1993 paper, proposing that the Federal Reserve's target interest rate could be well-approximated by:

$$r = r^* + \pi + 0.5(\pi - \pi^*) + 0.5(y - y^*)$$

- r^* is the equilibrium real rate
 - π is inflation, π^* is the target inflation rate
 - $(y - y^*)$ is the output gap (difference between actual and potential output)
- This simple rule tracked actual Fed behavior in the 1980s–90s remarkably well and continues to be used today.



Replacing a simple rule with an AI simulation

A big jump in complexity

	Taylor Rule	AI Policy Simulation
State representation	2–3 hand-picked variables	High-dimensional, learned features
Functional form	Linear, fixed coefficients	Nonlinear, learned weights
What it captures	A stable historical regularity	Potentially richer dynamics, regime shifts, qualitative signals
Validation	Decades of out-of-sample tracking	Much newer, less battle-tested



Why AI agents?

A new way to simulate interactive decision processes

- Growing body of literature shows that LLMs produce responses consistent with both economic theory and documented patterns of human behavior:
 - Horton, 2023 (Economics)
 - Dillion et al., 2023; Kosinski, 2023 (Psychology)
 - Bail, 2024; Ashokkumar et al., 2024 (Sociology)
 - Aubin Le Quéré et al., 2024; Park et al., 2024 (Computer Science)
- One place AI agents may be especially useful: as tools for modeling and experimenting with the policy process (not as replacements for policymakers).



FOMC *In Silico*

Joint work with Sophia Kazinnik of the Stanford Digital Economy Lab

- Simulating the FOMC meeting process using LLMs
- 12 FOMC members
 - 7 governors of the Federal Reserve System
 - 1 president of the New York Fed
 - 4 of the remaining 11 regional Fed presidents, who rotate annually
- 8 regularly scheduled meetings per year
 - Review economic and financial conditions
 - Determine the appropriate stance of monetary policy
 - Assess risks to long-run goals of price stability and sustainable economic growth



Research questions for a simulated Fed

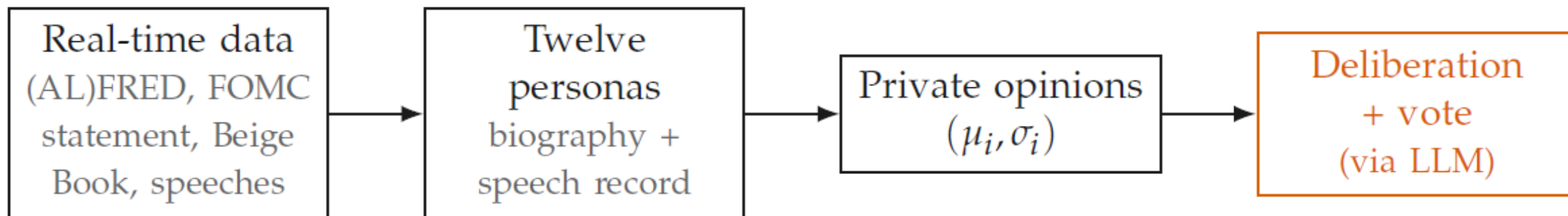
Questions we couldn't ask a simple policy rule

- How sensitive are interest rate decisions to the FOMC structure?
 - Different chair
 - Different rotation of voting for the regional Fed presidents
 - A change in timing of meetings
 - Importance of deliberation versus simply voting
- How sensitive are interest rate decisions to external conditions?
 - A change in data provided
 - Political pressure



The modeling process

From data through deliberation

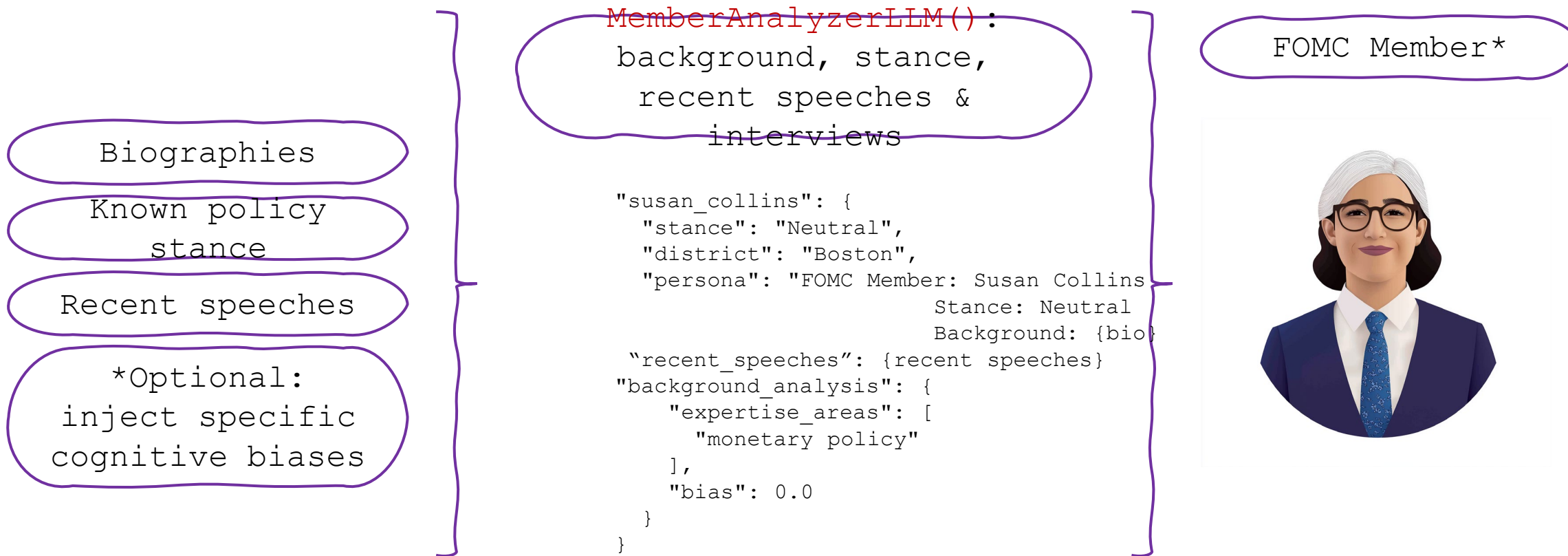




FOMC personas

Synthetic personas grounded in public information

- Biography and role (Governor/Board Member/President), career history, political affiliation
- LLM stance classification (hawkish / dovish / data-dependent)
- Recent speeches with temporal weighting



*Repeat this for each of the 12 current FOMC voting members



FOMC Member
Example

"rate change": 0.0,
"confidence": 0.65,
"rationale": "Current economic indicators reveal a complex landscape. The CPI at 2.4% suggests inflation is within a manageable range, but persistent pressures, especially on essential goods, indicate potential risks of future inflationary creep. The unemployment rate at 4.2% is slightly elevated, signaling some slack in the labor market, but not at levels warranting immediate intervention. The Beige Book highlights modest, uneven economic growth with regional disparities, exacerbated by policy uncertainty and federal funding constraints. These conditions suggest maintaining the current federal funds rate is prudent. This decision balances the dual mandate of price stability and maximum employment. A pause allows us to monitor inflation's trajectory and labor market stability without exacerbating current uncertainties. My confidence in this decision reflects the need for caution amid mixed signals, prioritizing flexibility and data-dependent adjustments as more information becomes available."

- Synthetic Adriana Kugler (initial opinion)



Historical validation

Targeting the committee-level outcome

- The sample includes every scheduled FOMC meeting from December 16, 2008, when the Committee first adopted a target range for the federal funds rate, through June 17, 2026, for a total of 140 meetings.
- The backtest is conditional on the state of the FOMC at each meeting.
 - Before every simulation, we reset the committee to the actual conditions prevailing at that point: the previous target range, the previous FOMC statement, and the actual roster of voting members.
 - The committee then makes a single policy decision.
- We test for memorization and show no clear break in performance at the training cutoff



Conditional Backtest by Monetary Policy Era

Simulated committee performance

Era	n	Exact (%)	Direction (%)	MAE (bp)
ZLB & recovery (2008–2015)	56	100.0	100.0	0.0
Normalization (2015–2019)	33	75.8	75.8	6.1
COVID (2020–2021)	15	100.0	100.0	0.0
Tightening (2022–2023)	16	43.8	75.0	17.2
Easing & recent (2024–2026)	20	70.0	70.0	8.8



Counterfactual example: data revision

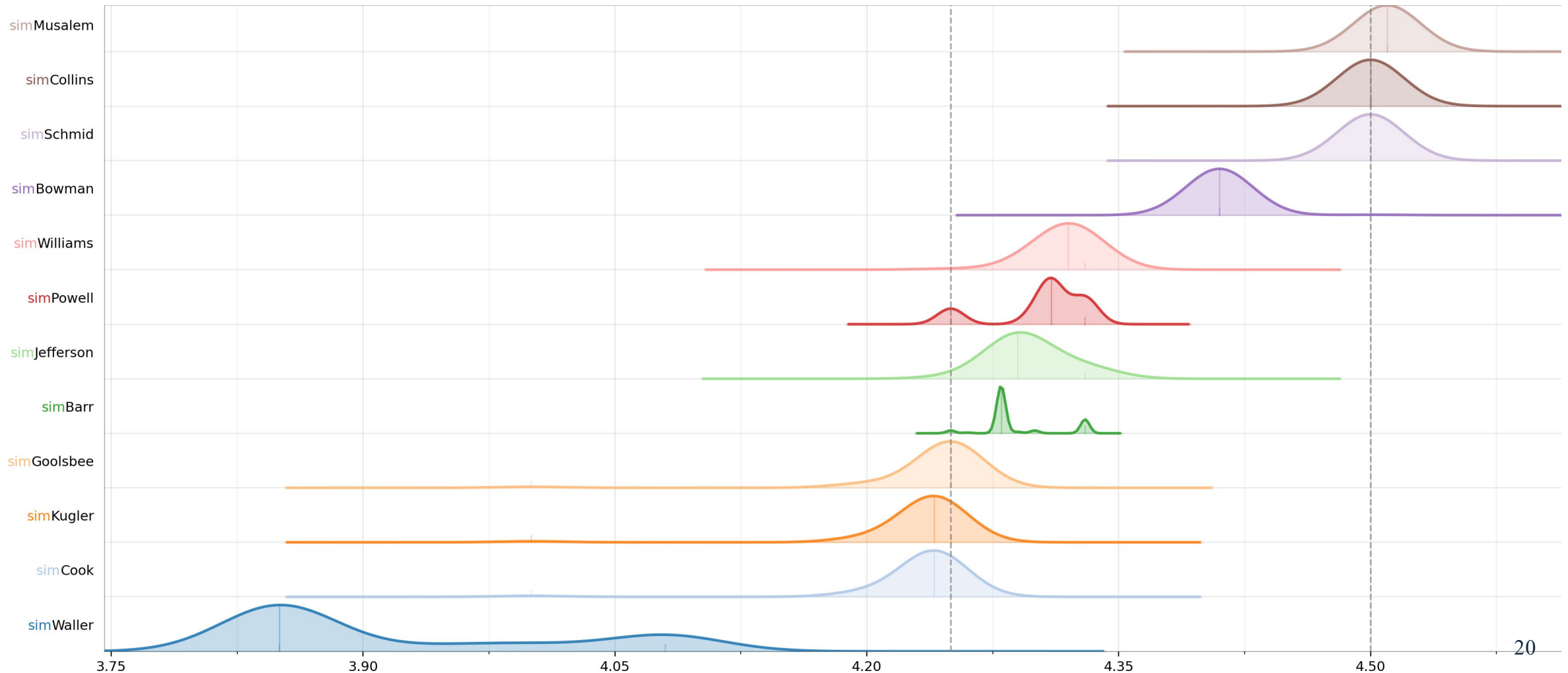
July 2025 FOMC meeting

- In July 2025 there was an FOMC meeting with a policy announcement of no rate change on July 30th (“maintain the target range for the federal funds rate at 4-1/4 to 4-1/2 percent”)
- On August 1st, the Bureau of Labor Statistics released revised employment data, reporting that “employment in May and June combined is 258,000 lower than previously reported.”
- What would the FOMC have decided if they had the weaker data in time for their meeting?
- Implementation of earlier version of our model that we ran at the time:
 - Macro dashboard adjusted to reflect softer labor conditions
 - Beige Book narratives revised accordingly
- Outcome: Rates drift modestly more dovish relative to baseline



Data revision: vote distributions

Kernel density estimate of each simulated member's votes





Predicting the latest FOMC meeting

The September 16, 2026 rate hike

- On September 16, 2026, the FOMC raised the target range by 25 basis points to 3.75–4.00 percent
 - 12–0 vote
 - first increase since 2023
- We ran the baseline engine on the vintage available on September 15 and scored it against the decision the next day. Three different information configurations:
 - Baseline: real-time data, the July 29 FOMC statement, and the September 2 Beige Book (narrative of regional economic conditions)
 - Enhanced 1: adding members' summer speeches
 - Enhanced 2: adding pre-meeting news digest
- Before deliberation, the committee is close to evenly divided, assigning probability 0.48 to a hike.
- After the policy discussion, that probability rises to 0.64.
 - In contrast to the average pattern in the historical validation, where deliberation tends to shift probability toward no change
- Across the three different information configurations, 21 of 21 chains choose a hike



Limitations

Structured simulation tool not a literal model of policymaker thinking

- Personas rely on public information only
 - This may be a positive in our case since public communication of how policy decisions are made is an important part of monetary policy
- Look-ahead bias affects historical analysis
- Currently only one-shot meetings – dynamics are important but the model drifts without re-anchoring



Takeaways

AI agents are useful for counterfactual analysis and prediction

- A synthetic FOMC lets us model policy as a committee process, not only as a reaction function.
- AI opens the door to institutional counterfactuals we cannot otherwise run.
 - chairs
 - rosters
 - agenda power
 - political (and other) shocks
 - data revisions
 - etc...

Thank you!

Check out the webpage for our research here:
<https://fomc-in-silico.vercel.app/>

Questions, comments, or suggestions?
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